

# PATENT ABSTRACTS OF JAPAN

(11)Publication number : 2003-050309

(43)Date of publication of application : 21.02.2003

(51)Int.Cl.

G02B 5/20  
G02B 5/28  
G02B 7/00  
G03B 21/14

(21)Application number : 2001-239465

(71)Applicant : FUJI PHOTO OPTICAL CO LTD

(22)Date of filing : 07.08.2001

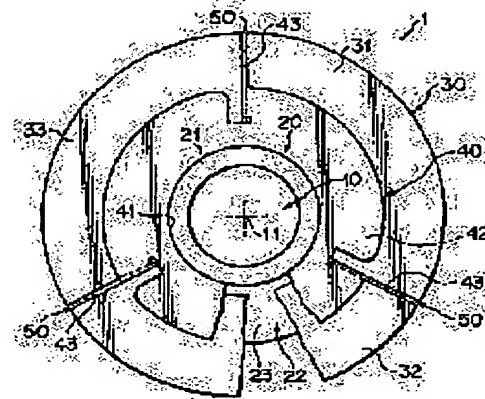
(72)Inventor : WATANABE TAKASHI

## (54) ROTARY OPTICAL FILTER DEVICE

### (57)Abstract:

**PROBLEM TO BE SOLVED:** To easily dispose optical filters with high accuracy in such a state that the optical filters adjacent to each other are separated at a minute distance from each other by using a holding member having barrier wall chips.

**SOLUTION:** Three optical filters 30 are arranged in the circumference direction around an axial line 11 and fixed to a holding member 40 and to a supporting body 20. The holding member 40 has three barrier wall chips 43 in the periphery of the base 42 and each barrier wall chip 43 is present between adjacent optical filters 30 and in contact with both filters to keep a small gap 50 to separate the filters from each other at a small distance.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

BEST AVAILABLE COPY

**\* NOTICES \***

**JPO and NCIPi are not responsible for any damages caused by the use of this translation.**

- 1.This document has been translated by computer. So the translation may not reflect the original precisely.
- 2.\*\*\*\* shows the word which can not be translated.
- 3.In the drawings, any words are not translated.

---

**CLAIMS**

---

[Claim(s)]

[Claim 1] In revolution light filter equipment equipped with the base material supported to revolve by this revolving shaft that has the back face which intersects perpendicularly with a revolving shaft, and two or more light filters arranged and supported by the hoop direction of said revolving shaft on said back face While having the septum piece which intervenes between two light filters with which said two or more light filters adjoin each other where these both light filters of both are contacted, and secures a slit among these both light filters Revolution light filter equipment characterized by coming to have the attachment component which holds said two or more light filters between said back faces after said slit has been secured by said septum piece, and is made to rotate with said base material and said two or more light filters.

[Claim 2] Said attachment component is revolution light filter equipment according to claim 1 characterized by having the base in which the pore inserted in said revolving shaft was formed, and which intersects perpendicularly with this revolving shaft.

[Claim 3] said septum piece and said base form said attachment component in one from plate-like part material -- having -- said septum piece -- said base -- receiving -- abbreviation -- the revolution light filter equipment according to claim 2 characterized by bending said a part of plate-like part material, and becoming so that it may start vertically.

---

[Translation done.]

**\* NOTICES \***

**JPO and NCIP are not responsible for any damages caused by the use of this translation.**

1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

**DETAILED DESCRIPTION**

---

[Detailed Description of the Invention]

[0001]

[Field of the Invention] In the illumination-light study system of a projection mold image display device etc., this invention relates to the revolution light filter equipment arranged in an optical path in order to change the color of the illumination light periodically.

[0002]

[Description of the Prior Art] As this kind of revolution light filter equipment, the color wheel equipment used as a color-separation means is known in recent years in the illumination-light study system of the projection mold color picture display which carries out light modulation of the illumination light by the image display component, and carries out amplification projection of it. Color wheel equipment is lightweight small compared with the color-separation optical system of the conventional 3 plate type, and is the color-separation means which was excellent also in cost.

[0003] As such color wheel equipment, the thing of the method (a "BARUZASU method" is called below) indicated by the open patent official report of JP,10-48542,A is known. The color wheel equipment of a BARUZASU method is characterized by the point which the light filter which forms the field of light transmission nature in a circle in the periphery part of the disc-like base material supported to revolve by the revolving shaft has fixed with adhesives, and the point that the field of a light filter in a circle is not interrupted for a holddown member like a maintenance web.

[0004] There are the following advantages by the field of a light filter in a circle not being interrupted for a holddown member like a maintenance web. That is, although the color wheel equipment made to interrupt the field of a light filter in a circle for holddown members, such as a maintenance web and a spoke, is known conventionally, since the field of a light filter in a circle is interrupted for remarkable width of face by the maintenance web or the spoke such conventionally in the case of equipment, the optical loss in the interrupted part will be large, and, on the whole, light transmission effectiveness will fall. On the other hand, by the BARUZASU method for which the field of a light filter in a circle is not interrupted, optical loss hardly arises.

[0005]

[Problem(s) to be Solved by the Invention] However, such color wheel equipment of a BARUZASU method produces the following problems in the point that the field of a light filter in a circle is not interrupted for a holddown member like a maintenance web.

[0006] That is, the field of a light filter in a circle is usually divided into two or more fields, and the light filter which is different from each other is arranged in each divided field. Therefore, in the BARUZASU method for which a field is not interrupted, it may be arranged in the condition without a clearance, i.e., the condition of having stuck, among what two or more light filters adjoin. For this reason, it will be in the condition that the light filters which adjoin each other press mutually by the thermal expansion of the light filter accompanying the turning effort at the time of actuation, or an oscillation or a temperature change etc., and there is a possibility that a light filter may be damaged.

[0007] Although what is necessary is just to make the light filters which adjoin each other estrange in order to prevent breakage of such a light filter, if clearance becomes large, optical loss will increase. For this reason, although extent on which the light filters which adjoin each other do not have an adverse effect mutually was expected to carry out minute distance alienation of each light filter, controlling optical loss as much as possible, it was technically difficult to arrange with a sufficient precision, where minute distance alienation of two or

more light filters is carried out, respectively, and to fix to a base material.

[0008] This invention was made in view of such a situation, can perform easily arranging with a sufficient precision, where minute distance alienation of the light filters which adjoin each other is carried out, and it aims at offering the revolution light filter equipment which can also control the optical loss between light filters, reducing possibility that a light filter will be damaged.

[0009]

[Means for Solving the Problem] In order to solve said technical problem the revolution light filter equipment of this invention In revolution light filter equipment equipped with the base material supported to revolve by this revolving shaft that has the back face which intersects perpendicularly with a revolving shaft, and two or more light filters arranged and supported by the hoop direction of said revolving shaft on said back face While having the septum piece which intervenes between two light filters with which said two or more light filters adjoin each other where these both light filters of both are contacted, and secures a slit among these both light filters Said two or more light filters are held between said back faces, after said slit has been secured by said septum piece, and it is characterized by coming to have the attachment component made to rotate with said base material and said two or more light filters.

[0010] Said attachment component should be equipped with the base in which the pore inserted in a revolving shaft was formed and which intersects perpendicularly with a revolving shaft. a septum piece and a base form said attachment component in one from plate-like part material -- having -- a septum piece -- a base -- receiving -- abbreviation -- a part of plate-like part material shall be bent, and it shall become so that it may start vertically

[0011] In addition, the above "a revolving shaft" means the part used as centers of rotation, such as Rota where turning effort is transmitted, and a shank of a base material, and the axis of a still more nearly imagination revolution is also included. Moreover, the above "supported to revolve by the revolving shaft" means the case where it is directly supported to revolve by the part used as centers of rotation, such as Rota and a shank of a base material, and the case where it is indirectly supported to revolve by these revolving shafts through other members.

[0012]

[Embodiment of the Invention] It explains referring to a drawing about the operation gestalt of the revolution light filter equipment concerning this invention hereafter. Drawing 1 is drawing in which fracturing a part and showing the outline of the revolution light filter equipment concerning 1 operation gestalt of this invention, and drawing 2 is the fragmentary sectional view. In addition, in drawing 2, only the upper half is illustrated among the whole equipment shown in drawing 1, and the graphic display of a lower half which has a symmetrical configuration is omitted.

[0013] It is color wheel equipment 1 of the transparency mold used in a projection mold color picture display, and this operation gestalt equipment is equipped with the attachment component 40 holding the light filter 30 led to the image display component which decomposes into each colored light component and does not illustrate the illumination light from Rota 10 where turning effort is transmitted, the base material 20 supported to revolve by this Rota 10, and the light source which is not illustrated from the electric motor which is not illustrated, and a light filter 30.

[0014] A base material 20 consists of a shank 21 of the shape of a cylinder fixed to Rota 10 in one, and a supporter 22 of the shape of a disk which extends on the radial outside of the axis 11 of Rota 10 from the periphery section of a shank 21. In addition, a base material 20 is formed with a light metal, for example, aluminum, its alloy, etc.

[0015] The light filter 30 consists of three kinds, the red optical filter 31 which penetrates only a part for red Mitsunari among illumination light, the green light filter 32 which penetrates only a green light component, and the blue glow filter 33 which penetrates only a blue glow component. The filters 31, 32, and 33 of each color have the sector-like configuration where it was formed with the glass ingredient, respectively, and 3 \*\*\*\*s of annulus rings were made into the radial from the core, and fix to a base material 20 and an attachment component 40 in the condition of having been arranged in the hoop direction of an axis 11. In addition, the optical property of each filters 31, 32, and 33 is obtained by the approach generally learned, such as forming in a front face the die clo IKKU film which reflects or penetrates only the flux of light of one color respectively among three-primary-colors light.

[0016] The attachment component 40 which held the light filter 30 to drawing 3 is shown. As shown in this drawing 3 or drawing 2, the attachment component 40 is constituted by equipping the pore 41 which is in the outer diameter of the shank 21 of a base material 20, abbreviation, etc. by carrying out, and has the bore of magnitude with the disk-like base 42 which was formed in the core and which extends on the radial outside of an axis 11, and inserting a pore 41 in the shank 21 of a base material 20 so that it may be supported by the shank 21 of a base material 20 pivotable focusing on an axis 11.

[0017] Moreover, the septum piece 43 started by the abbreviation perpendicular to the base 41 is formed in each location which divides this periphery section into three equally in a hoop direction at the periphery section of a base 42, respectively. The septum piece 43 is bent by the abbreviation perpendicular to a base 42, and an attachment component 40 is formed while a base 42 and the septum piece 43 are pierced and formed in one from an aluminum plate with a thickness of 0.1mm.

[0018] Between the hoop direction edges of the light filter 30 which adjoins each other, the septum piece 43 intervenes, where both both edges are contacted, and it secures the slit 50 prolonged at a periphery edge from the direction inner circumference edge of a path between both edges. It is set to the 0.1 samemm, and the light filter 30 of three sheets is in the condition which 0.1mm clearance was secured, respectively between the board thickness and abbreviation two light filters 30 which adjoin each other, and was arranged in the hoop direction of an axis 11, and the minimum interval of a slit 50 fixes to an attachment component 40 and a base material 20. In addition, as for the width of face of a slit 50, it is desirable to set it as about 0.4mm or less which can control the effect of optical loss.

[0019] Fixing to the attachment component 40 and base material 20 of a light filter 30 is made using the adhesives of an epoxy system etc. After specifically putting an attachment component 40 on the receptacle fixture which positions and carries out temporary maintenance of a light filter 30 and the attachment component 40 and applying adhesives to a base 41, it arranges and piles up on an attachment component 40 in a hoop direction, making the light filter 30 of three sheets contact the septum piece 43, and the light filter 30 of three sheets and an attachment component 40 are pasted up by the approach of carrying weight on it further and stiffening adhesives. Next, the light filter 30 of three sheets and a base material 20 are pasted up by the approach of putting a base material 20 on the receptacle fixture which positions and carries out temporary maintenance of an attachment component 40 and the base material 20, applying adhesives to the back face 23 of a supporter 22, turning down the attachment component 40 which the light filter 30 pasted up on it, piling up a light filter, carrying weight on it further, and stiffening adhesives.

[0020] By taking such an adhesion approach, it can perform easily arranging with a sufficient precision, where minute distance alienation of each of two light filters 30 with which the light filter 30 of three sheets adjoins each other is carried out, and fixing to a base material 20.

[0021] A base material 20, a light filter 30, and an attachment component 40 are made to rotate in one by revolution of Rota 10, and the color wheel equipment 1 constituted as mentioned above decomposes into each colored light component the illumination light irradiated by the light filter 30 from the light source by time sharing by it.

[0022] As mentioned above, although 1 operation gestalt concerning the revolution light filter equipment of this invention was explained, the revolution light filter equipment of this invention is not restricted to the operation gestalt mentioned above, but modification of various modes is possible for it. For example, although the light filter is fixed with adhesives to the attachment component and the base material in said operation gestalt, respectively, it is also possible to fix by thermal melting arrival, \*\* arrival, etc. depending on the construction material of a light filter, or an attachment component and a base material.

[0023] Moreover, a light filter can also take the mode which fixes to either an attachment component or a base material. For example, a light filter is fixed only to an attachment component, and it is possible for it to be stuck to a base material by pressure, and to make it support by the attachment component or another press member, and it is indicated by the detail in the description applied to this application and the patent application indicated by these people under this date as such a sticking-by-pressure mode.

[0024] Moreover, although said operation gestalt is color wheel equipment of a transparency mold, it may be color wheel equipment of the reflective mold with which the die clo IKKU film which reflects only the flux of light of one desired color in three fields corresponding to the three primary colors respectively among three-primary-colors light as revolution light filter equipment of this invention was formed.

[0025] Moreover, it sets to this invention and color wheel equipment is not restricted to that to which 3 \*\*\*\*s of the fields in which each primary lights are penetrated or reflected are carried out. It should be formed in a field in which the colored light which mixed what has them and colored light other than the three primary colors, for example, the white light, and two colors in the three primary colors is penetrated or reflected. [ in which one of fields is large or it is narrow ]

[0026] Furthermore, as for the revolution light filter equipment of this invention, application is not limited to color wheel equipment. It is applicable also to equipment equipped with the light filter to which it does not decompose into colored light but other elements, such as brightness of the light from the light source, are changed.

[0027]

[Effect of the Invention] Where a slit is formed between two light filters which two or more light filters arranged in the hoop direction of a revolving shaft adjoin by the septum piece of an attachment component, it is held by the attachment component, and it is made to support with the revolution light filter equipment of this invention, as explained above by the base material.

[0028] Therefore, according to the revolution light filter equipment of this invention, it can perform easily arranging with a sufficient precision, where minute distance alienation of the light filters which adjoin each other is carried out by using an attachment component. And it becomes possible to also control the optical loss between light filters, this reducing possibility that a light filter will be damaged.

---

[Translation done.]

\* NOTICES \*

JPO and NCIPi are not responsible for any damages caused by the use of this translation.

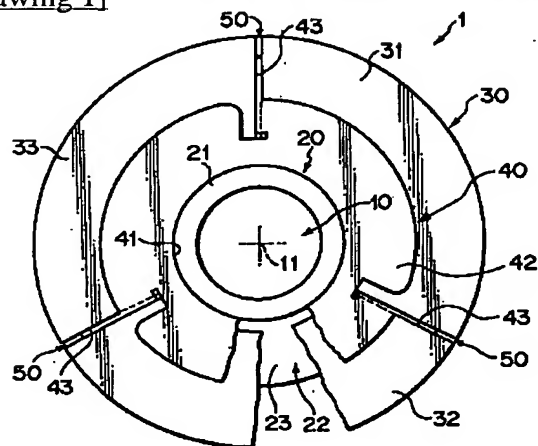
1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

---

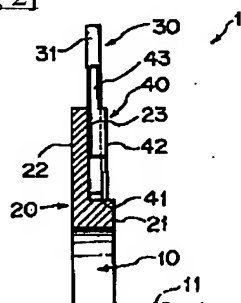
DRAWINGS

---

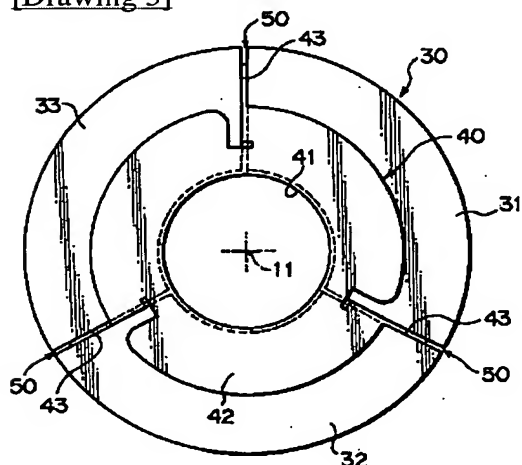
[Drawing 1]



[Drawing 2]



[Drawing 3]



---

[Translation done.]



**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ **BLACK BORDERS**
- ☐ **IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- ☐ **FADED TEXT OR DRAWING**
- ☐ **BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- ☐ **SKEWED/SLANTED IMAGES**
- ☐ **COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- ☐ **GRAY SCALE DOCUMENTS**
- ☐ **LINES OR MARKS ON ORIGINAL DOCUMENT**
- ☐ **REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- ☐ **OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**